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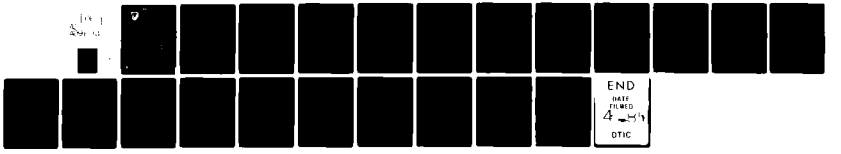

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HANDBOOK

# FOR EVALUATING ECOLOGICAL EFFECTS OF POLLUTION AT DARCOM INSTALLATIONS

VOLUME 1.

INTRODUCTION AND CHECKLIST OF BASIC QUESTIONS



DECEMBER 1979

**U.S. ARMY DUGWAY PROVING GROUND**
**Dugway, Utah 84022**

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Volume 1 of seven volumes dealing with evaluating ecological effects of pollution at DARCOM installations

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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This handbook provides the DARCOM commander with a tool whereby he can respond quickly to a potential or actual polluting incident with a decisive program to evaluate the ecological effects of the pollution. To implement the procedures as set forth in the handbook, the commander will enlist the help of an environmental team composed of DARCOM scientists (or other suitable personnel) and individuals with limited ecological training (paraecologists) who will do much of the manual labor. With a given volume, the team can perform the required functions. (con't)

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The handbook covers the following areas in seven volumes of which this is Volume 1: (1) basic questions that need answering, (2) conducting the preliminary investigation of the problem, (3) determining the specific effects of a pollutant (the first three volumes are essentially library efforts), (4) terrestrial sampling, (5) aquatic sampling, (6) unexpected declines in animal populations and (7) handling data.

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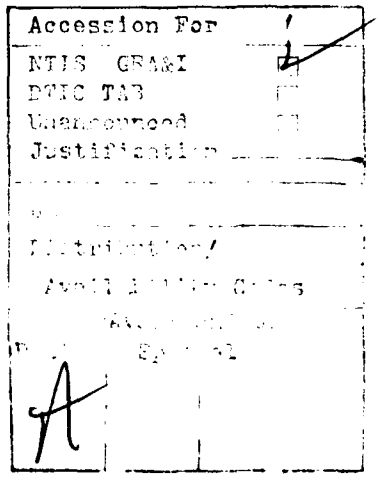

## FOREWORD

This volume was prepared by Dr. Carlos F.A. Pinkham and David A. Gauthier. People who have contributed written material to Volume 1 are:

Background . . . . . Dr. F. Prescott Ward[1]

Checklist of Basic Questions . . . . . CPT Lamont W. Law[1]

In addition the following people and organizations are gratefully acknowledged for providing useful discussion and criticism during the preparation of this handbook:

Editorial Office[2]

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Allen E. Hilsmeier[1]

Finally, the secretarial staff of Environmental and Life Sciences Division[2] and the staff of the Technical Library[2] are gratefully acknowledged for their serivces.

---

[1]U.S. Army Chemical Systems Laboratory, APG, MD 21010

[2]U.S. Army, Dugway Proving Ground, Dugway, UT 84022

[3]Commanding General, U.S. Army Test and Evaluation Command, APG, MD 21005

## BACKGROUND

An environmental awakening burgeoned in this country during the late 1960's in response to a deteriorating environment. Problems with air and water pollution, solid waste disposal, intemperate use of pesticides, urban blight, loss of habitat, and poor land-use policies translated into inordinate consumer expenses (e.g. health care and deterioration of personal property) and a reduction of leisure and aesthetic opportunities.

Congress responded to public clamor for enhanced environmental quality via many legislative mandates, most notable the National Environmental Policy Act, Clean Air Act, Federal Water Pollution Control Act, Endangered Species Act, Toxic Substances Control Act, Resource Conservation and Recovery Act, Federal Environmentl Pesticide Control Act, and the Coastal Zone Management Act.

An accompaning plethora of Presidential Executive Orders further defined national policy and priorities. These include Floodplain Management, Exotic Organisms, Protection of Wetlands, Refuse Act Permits, and Environmental Quality.

These Public Laws and Executive Orders impact directly on all federal agencies. The times have changed remarkably, and the once peripheral discipline of environmental science is now an integral part of the Army mission. For example, commanders of all military installations are enjoined: to prepare an Environmental Impact Statement on any action funded, authorized, or carried out by them that could significantly affect the quality of the human environment; to develop programs for conserving endangered species and to insure that their activities neither jeopardize the continued existence of endangered species nor modify their critical habitat; and to comply with air quality, water quality, solid waste management, and noise abatement standards.

These and other recent edicts have spawned Army regulations and directives at a prodigious rate. The basic document, Army Regulation 200-1 (Environmental Quality, Environmental Protection and Enhancement) places extensive responsibilities within the purview of installation commanders -- responsibilities for jobs that were once superfluous to the traditional mission of the Army. Yet environmental initiatives usually translate into significant cost savings, or smoother planning and implementation of major projects. Preparation of an Environmental Impact Statement, for example, often elucidates problems early in the planning stages of a project; early enough to be rectified through design changes, or use of alternate technologies. Non-compliance after implementation of a project could have severe repercussions via exceeding standards, litigation conflicts in land-use policy, or other factors.

As the emphasis on environmental considerations increased within the Department of Army (DA), the reliance on surveys into the ecological effects of pollution (pollution ecology surveys - PES) also increased. Initially, the only available methods were those of classical ecology. It soon became apparent that these methods were not always adequate to answer questions that were germane to a PES. As a consequence, an evolving methodology for pollution ecology has emerged. In spite of this development, two deficiences remain in the DA PES program: (1) the appropriate methods have not been assimilated into a single unified approach and (2) an adequate number of trained personnel are not available within DA. This handbook is a major step in a continuing effort to overcome these deficiencies.

## OBJECTIVE

This handbook is designed to assist a commander in discharging his environmental responsibility to comply with appropriate Public Laws, Executive Orders, state regulations and military directives. Specifically, it contains methods for defining the magnitude of many pollution problems associated with military operations. These methods are used by an environmental team composed of a nucleus of the Army's environmental scientists and individuals who could be trained by the scientists to accomplish the routine operations of most pollution ecology surveys[1].

[1]These personnel will be refered to as "paraecologists" in the remainder of this handbook. They do not necessarily have to come from the installation. For example, students from local universities could make excellent paraecologists.

## CONCEPT

The handbook employs methods that: (1) are adaptable to the particular problem at hand, (2) reduce errors, (3) provide for prediction and retrospective evaluation, (4) produce results in a reasonable time and (5) produce data that can be extrapolated from one study to another[1].

[1]For an editorial on the need for this type of approach, see Science, 192:509, 7 May 1976.

## USE OF THIS HANDBOOK

With the aid of this handbook, the paraecologists, under the guidance of the environmental scientists, can locate relevant information, conduct field surveys and organize the resulting data for analysis. The following discussion illustrates how the approach commonly would be implemented from the first identification of the problem to its ultimate solution.

There are three action groups: (1) command is someone in a position of command responsibility, (2) environmental scientists are the Dugway Proving Ground/Chemical Systems Laboratory (DPG/CSL) ecology team or suitable contractors, and (3) paraecologists are appropriately trained personnel at the respective DARCOM installations. The PES is divided arbitrarily into eight phases. The major action passes back and forth between the action groups, often with interaction with other action groups. As the major action passes through phases, the data base is expanded, finally reaching that point in Phases VI and beyond when it can be analyzed and interpreted, with the results conveyed to the command for action:

Phase I: In Phase I the problem (something that is anticipated because of new plans or something that has been overlooked in the past) is identified by the command. The command uses the "Checklist of Basic Questions" included in Volume 1 to obtain information to be used by the scientists to shape the plan of action at the scientific level.

Phase II: In Phase II the scientists (one to three people), use Volumes 2 and 3 to identify data needs. The installation environmental impact assessment (IEIA) is obtained from the installation. The data in the IEIA relevant to the problem are evaluated for adequacy, based upon the scientists' knowledge and the information called for in Volumes 2 and 3. Data gaps are identified whenever the essential background data are inadequate.

Phase III: In Phase III, as many data gaps as possible are filled through literature surveys conducted by the paraecologists under the supervision of the scientists. At this point, the team should consist of one to three scientists and two to six paraecologists. It is possible that an EIA or EIS, if not already available, can be written after this phase is completed.

Phase IV: In Phase IV the scientists design a sampling and analysis program based upon all the data previously gathered and the methods available in Volume 4 (Terrestrial Sampling), Volume 5 (Aquatic Sampling), Volume 6 (Unexpected Animal Population Declines) and Volume 7 (Analysis Methods).

Phase V: In Phase V the paraecologists conduct the sampling program developed in Phase IV, using the techniques detailed in Volumes 4 through 6.

Phase VI: The data are analyzed using the analysis methods determined in Phase IV. The paraecologists prepare the data for analysis using the directions indicated in Volume 7 and obtaining help from the scientists when requred.

Phase VII: All past data bases and data analyses are brought together in this phase by the scientists, who interpret the data bases and data analyses.

Phase VIII: The scientists will determine whether the environmental effect is major or minor and report this conclusion orally to the command. Necessary reports will follow the Command briefing. An EA or ES, if required, but not completed earlier, is completed using the same data bases and analyses. Continued surveillance will be maintained as long as conditions warrant.

In addition to guiding DA personnel through a PES, this handbook can be used by the commander to prepare protocols for contracting one or more aspects of a PES.

To assist the reader, most technical terms are defined upon their first usage. However, An Ecological Glossary[1] is an excellent ready reference for the handbook.

It is likely a given problem will not require all the information and techniques outlined in the following volumes; rather, each problem will require a unique combination of information and techniques. A major job of the scientist is to determine exactly what information and techniques are required to solve the problem and to reduce the work accordingly. He may even have to introduce new information requirements and techniques, although an effort has been made to cover the commonly encountered problems. If innovation is necessary, a copy of the new material should be forwarded to:

Commander
USA Dugway Proving Ground
ATTN: STEDP-MT-L
Dugway, UT 84022

for possible inclusion in the next revision of the handbook.

[1]U.S. Army Corps of Engineers, Washington, DC 20314. An Ecological Glossary for Engineers and Resource Managers, 1973.

## CHECKLIST OF BASIC QUESTIONS

INTRODUCTION

If pollution is detected or anticipated at a DARCOM installation, the command should obtain answers to as many of the basic questions as possible before contacting the scientists who will direct the survey.

CHECKLIST

I. POLLUTANT

A. Identity

1. What is its general type?[1]

2. What is its specific name (if known)?

B. Quantity

1. Schedule of Release

a. During what hours of the day does release occur?

2. Rates of Release

a. What is the average hourly rate of release?

b. What is the peak rate of release?

c. What is the frequency of occurrence of this peak rate?

II. DIMENSIONS

A. Is the source mobile or stationary?

[1]Pollutants can include chemicals, biologicals (pathogens), noise, odors, rapid pressure changes, electromagnetic radiations, ionizing radiation (radionuclides), thermal disturbances and habitat disruption.

B. Is it a point source?[1]

C. Is it a line source?[1]

D. Is it an area source?[1]

III. NAME AND LOCATION

A. Name of installation

B. Location of installation

C. Polluting activity at installation

D. Nature of the medium receiving the pollutant (water, air, soil, organism, etc.)

E. Name of receiving body if applicable.

IV. TIMING

A. Is this a prior problem?

B. Is this an on-going problem?

C. Is this a future problem?

V. URGENCY

A. What are the priorities of this problem?

B. What other activities depend upon resolution of this problem?

C. What are the legal considerations?

VI. ENVIRONMENTAL IMPACT STUDY

Has an environmental assessment or statement been prepared?

A. No.

B. Yes - where are copies filed?

[1]Point source: The pollutant enters the environment from a single source such as a smokestack; line source: several stationary sources in a line or a mobile source releasing the pollutant as it moves; area source: a large number of dispersed sources such as in a large manufacturing complex.

VII. CONTACT FOR TECHNICAL DATA

A. Name

B. Location

C. Office

D. Autovon number

E. Mailing address

VIII. CONTACT FOR ADMINISTRATIVE DETAILS AT THE INSTALLATION

A. Name

B. Location

C. Office

D. Autovon

E. Mailing address

NOTES

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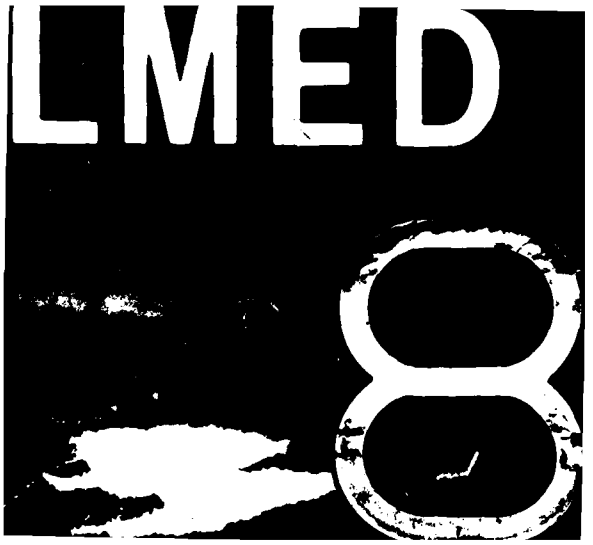
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